Illinois Mathematics and Science Academy
1500 Sullivan Road
Aurora, IL 60506-1000

Application For SIR Placement at Fermi National Accelerator Laboratory (FNAL)

(provide two recommendations – see rec form; please use a computer to complete this application legibly)

Name: Nusgart (Last) Nicholas (First) J (Middle) Date: 3/26/2015 (month / day / year)

Home Address: 2S119 Apache Drive (Number and Street)

Wheaton (City) IL (State) 60189 (Zip Code) Home Telephone: (630) 682-8892 (include area code)

Person to be notified in an emergency: Cathy & Jonathan Nusgart

Telephone (office hours): (630)533-0110 (include area code) Telephone (other hours): (630) 682-8892 (include area code)

Student Cell Phone: (630)-533-4401 Year of Graduation: 2017

Suggested FNAL Advisor: _____

■ Gender: male ☐ female Age: 16 Country of Citizenship*: USA

*Citizens other than from the United States must complete the following information:

Permanent Resident: ☐ Yes ☐ No

Place of Birth: _____ (City, State, Country)

Passport No.: _____ Expiration Date: _____

All non-U.S. citizens must present their original, unexpired foreign passport on the first day of the program. Photocopies are not acceptable. Depending on your circumstances, you also must present:

- Form I-94 Arrival Departure Card that shows lawful admission to the U.S. and the end date of your "authorized stay", **PLUS**:
  - Form I-797 Notice of Action approving H-4, O-3, TD, E-3 or other nonimmigrant (temporary) visa status in the U.S. , OR
  - Form DS-2019 Certificate of Eligibility for J-2 status, OR
  - Form I-20 showing F-2 status, **OR**
- Greencard (Alien Registration Card, or I-551 Card) showing grant of lawful permanent resident status.

Describe your skills, abilities, proficiencies; please be honest.

Highest Math Level/Skill: Currently enrolled in Calculus I, have been a member of the Wheaton Warrenville South High School and IMSA math teams

Skill with Statistics: In Methods in Scientific Inquiry, I had to use ANOVA, the t-test, and the f-test in an experiment that a partner and I designed.

Science Classes: Methods in Scientific Inquiry, SI Biology, SI Chemistry, Physics Sound&Light,

Describe Your Laboratory Skills: In the course of my various science classes, I have had to utilize Bunsen burners, scales, pipettes, and graduated cylinders. I am comfortable using this scientific equipment to conduct laboratory experiments.

Prior Research (SIR) Experience (include advisor name/location): None

Computer Proficiency: Please indicate your skill level for each of the below.

	none	**introductory**	**intermediate**	**advanced**
Basic		X		
C/C++				X
Fortran		X		
Java				X
Other Languages(list)			Scheme, Elisp, GLSL	Python, perl, C#, sh/bash, ECMAScript, Common Lisp
Mathematica		X		
Matlab		X		
Other Programs (list)			Spreadsheets	Terminal/Shell
Unix(Linux)				X
Windows			X	
Mac				X
Other OS (list)				

Rank Your Interests (Do not rank any area that you would not be willing to pursue an investigation in.

_5_ Accelerator Component Testing, Theory and Design
_3_ Astrophysics Data Analysis, Detector Development, Theory
_4_ Computer Networking, Computing for Analysis, Data Analysis of Experiments, Computer Simulation and Modeling
___ Detector Design and Testing
___ Electronics Design and Testing
_8_ Instrumentation and Diagnostics
_9_ Radiofrequency (RF) Systems
___ Magnet Systems
_7_ Mechanical Design and Development
_2_ Particle Physics Phenomenology
_1_ Particle Physics Theory
_6_ Superconducting Technology

Attach an application that includes the following items:

- Academic honors and awards that you have received. Please limit to ten or less honors/awards that you feel are the most significant.
- Extracurricular activities, interests, and any leadership role(s). Please limit to ten or less activities/interests that you feel are the most significant.
- Explain why research at FNAL would be a benefit to you and what you expect from participation in an investigation at FNAL. (Limit your answer to 250 words or less.)
- What would you tell a FNAL scientist about yourself so that you would be selected to work with her or him? (Limit your answer to 250 words or less.)
- Explain one exceptional experience you had with STEM in the last year. (Limit your answer to 250 words or less.)

Placement at FNAL also requires:

- Fermilab Visitor ID Form (form attached)
- Proof of Medical Coverage (form attached)
- Work Permit (required of students who are under 16 years of age)
- Documentation of Immigration Status (see first page)
- Authorization for Issuance of an ID Card (form attached)
- Student Registration (form attached)

- Note that some information is repeated on the attached forms, which will be filed with the appropriate offices at FNAL once a student has a specific placement.

I understand that by submitting this application for placement at the **Fermi National Accelerator Laboratory** *I may not apply for or seek other SIR opportunities until a decision has been made about this application. Placement for SIR at FNAL is not guaranteed by submission of this application.*

Cathy Nugent 5/8/15 Nick Nugent 5/8/15

Signature of Parent/Guardian Date Signature of Applicant Date

Academic honors and awards that you have received. Please limit to ten or less honors/awards that you feel are the most significant.

Wheaton Warrenville South High School:
High honor roll both semesters freshman year

Extracurricular activities, interests, and any leadership role(s). Please limit to ten or less activities/interests that you feel are the most significant.

Wheaton Warrenville South High School freshman year: cross country, math team, track, speech team
IMSA sophomore year: Math team, cross country, robotics, track
Hubble Middle School 8th Grade: Winter 2012-2013 IMSA Power pitch participant as a founder of Integrative Technologies.
Boy Scouts- Life Scouts

Essay #1: Explain why research at FNAL would be a benefit to you and what you expect from participation in an investigation at FNAL. (Limit your answer to 250 words or less.)

I have been fascinated by particle physics ever since I was eight years old and the opportunity to gain practical experience in laboratory work at Fermilab would be enlightening. I would benefit from research at Fermilab by gaining firsthand knowledge of how a world class physics lab operates, which would provide a model how physicists work in a real laboratory setting. I would also have the opportunity to learn from some of the best physicists in the world and learn how these individuals collaborate to achieve their goals.

I expect that I would be able to play an active role in a research program at Fermilab. I would be willing to assist in any capacity of research because I want to gain practical knowledge to complement my theoretical knowledge. I am planning to major in physics in college, and in order to help me decide what kind of physicist I want to become, I would like to see what real physicists do in the course of their work.

I would gain immeasurable amounts of knowledge and practical experience from participation in research at Fermilab because of I could assist with and witness actual physics research being conducted such as the creation of models that experiments test against, how data is analyzed, or how detectors are designed. This would provide me with real world information to reinforce the information that I am learning at IMSA.

Essay #2: What would you tell a FNAL scientist about yourself so that you would be selected to work with her or him? (Limit your answer to 250 words or less.)

I will be a junior next fall 2015 at IMSA. I am passionate about science, especially particle physics. Currently, I am enrolled in physics: sound & light and as a junior I will be taking calculus based mechanics, calculus based electromagnetism, and advanced chemistry, and calculus II and III.

My specific interest in conducting research at Fermilab began when I attended Fermilab's Saturday Morning Physics as an 8th grader to learn more about how accelerator laboratory research is conducted. As part of this program, I was able to take tours of various buildings including the D0 detector and the Tevatron accelerator, which solidified my interest in Fermilab because I found them fascinating.

If I am selected, I am confident that my experiences at IMSA, specifically in MSI and problem solving, will enable me to effectively work in a laboratory environment. I am a self-directed learner, enjoy collaborating with others, and am a diligent worker. I pay attention to detail and take pride in my work and am open to constructive criticism. Additionally, I am proficient in computer programming in multiple languages and programming paradigms. Nearly everything I do seems to involve physics, from the books I read to even the games I play such as Kerbal Space Program. Moreover, since I attend IMSA, I am located closely to Fermilab and would be able to devote more time to my SIR research project and be more readily available to the scientists that I would work with in my SIR project.

Essay #3: Explain one exceptional experience you had with STEM in the last year. (Limit your answer to 250 words or less.)

This year was my first year at IMSA. As a sophomore I took Methods of Scientific Inquiry. As part of this class I had to design an experiment with a partner. My partner and I choose to conduct an experiment on the efficiency of solar panels using light of various spectra. More specifically, we tested to see whether solar panels were tuned towards any spectrum, if they were, whether this was similar to the sun's spectrum, and if it was not, whether this could be shifted. We had to design the experiment, obtain the necessary materials, conduct the experiment, analyze our data and write up the results through collaborative effort.

We found that solar panels exhibited significant differences in efficiency under four different spectra: that of an incandescent bulb, a halogen bulb, a fluorescent lamp, and a LED bulb. Of these, the halogen bulb was the most efficient, followed by the incandescent bulb and then the LED. The fluorescent lamp was by far the least efficient. These seem to be ordered by their similarity to the solar spectrum in that the high temperature smooth blackbody spectrum of the halogen lamp was the most efficient, while the lower temperature spiked spectrum of the CFL was the least efficient in terms of the electrical power generated by the solar panel as a fraction of input power.

This experience was important because it taught me how actual experiments are designed and conducted, in addition I learned that I enjoy collaborating with others.

Student Name: NUSGART, Nicholas Joseph
Date of Birth: 12/31/1998
Entry Date: 08/14/2014

Illinois Mathematics and Science Academy
School Code:140177

		Sem1	Sem2	Credit
Y14-15				
Grade 10	Literary Explorations I	B		0.50
Grade 10	Literary Explorations II		B	0.50
Grade 10	American Studies	B-	B-	1.00
Grade 10	Mathematical Investigations IV	C-		0.50
Grade 10	BC Calculus I		B+	0.50
Grade 10	Scientific Inquiries - Chemistry		A	0.50
Grade 10	Scientific Inquiries - Biology	B-		0.50
Grade 10	Methods in Scientific Inquiry	B		0.50
Grade 10	Physics: Sound and Light		A	0.50
Grade 10	Moving and Learning	C	B	0.50
Grade 10	Spanish II	B	B	1.00

Diane M Stegmeyer

Registrar 06/10/2015

Academic Program
All IMSA courses are college preparatory.

Explanation of Grades

A	Exceeds course requirements
B	Meets course requirements
C	Needs improvement
D	Does not meet course requirements; no Academy credit awarded
I	Incomplete, course requirements not completed when grades were issued
WF	Withdrawn from course with failing grade; no Academy credit awarded
W	Withdrawn from course; no Academy credit awarded

Pass/Fail Options

P+	Exceeds course requirements (Pass with Distinction, used only in Independent Study and Student Inquiry and Research courses)
P	Meets course requirements; Academy credit may/may not be awarded depending on course grading criteria
F	Does not meet course requirements for course taken pass/fail; no Academy credit awarded

Intersession (one week non-credit course)

S	Satisfactory completion of requirements
U	Unsatisfactory completion of requirements

GPA/Class Ranking Policy
In light of IMSA's selective admission process and in order to promote collaborative exploration and discovery, the Academy does not compute grade point averages and class rankings.

Standardized Test Scores
Standardized test scores are provided by the student.

Student Inquiry and Research
(Inquiry and Mentorship) includes on-campus and off-campus experiences in which students plan, investigate, analyze, and communicate in-depth scholarly investigation, either guided or directed, by scientists, scholars, and/or educators.

TALENT (Total Applied Learning for Entrepreneurs)
Is a program that promotes entrepreneurial applied science and technology.

Federal and State Constitution Requirements
Are fulfilled with successful completion of American Studies.

Physical Education Requirement
Is fulfilled with successful completion (pass) of physical education or wellness.

Notice to persons or agencies receiving student records:
Section 438(b)(4)(B) of U.S. Public Law 93-380 requires that this pupil record information be transferred to you only on condition that you will not permit any other party to have access to it without the written consent of a parent/guardian or eligible student.

IMSA
Illinois Mathematics and Science Academy
1500 Sullivan Road
Aurora IL 60506
Phone 630-907-5066 Fax 630-907-5922

Illinois Mathematics and Science Academy

The World's Leading Teaching and Learning Laboratory for Imagination and Inquiry

Student Inquiry and Research
Recommendation Form

Student Name: Nicholas Nusgart_____ graduation year __2017_____

Recommender_____Peter Clancy_____pclancy@imsa.edu_____
(name) (email)

Recommender: The student listed above wishes to participate in the Student Inquiry and Research (SIR) Program. SIR advisors are frequently requesting additional information so your assistance is needed in recommending and evaluating students. This completed form, as a pdf file, may be sent to off-campus individuals to assist with best placement of students.

1. Please rate the student on each of the following criteria, with 5 being highest and 1 being lowest, based on your experiences with IMSA students.

Criteria	5	4	3	2	1	No basis for judgment
Motivation for the investigation	X					
Intellectual potential	X					
Ability to analyze/problem solve	X					
Teamwork skills			X			
Perseverance	X					
Maturity		X				
Works independently	X					
Communication skills		X				
Integrity	X					
Overall judgment		X				

Please comment on the preparedness of the student to participate in an independent investigation.

He is extremely talented and science and very intellectually curious. He will be a good worker and investigator in any project that he is given.

Is there anything else that you feel a potential advisor should know about this student?

NA

Illinois Mathematics and Science Academy

The World's Leading Teaching and Learning Laboratory for Imagination and Inquiry

Student Inquiry and Research
Recommendation Form

Student Name Nicholas Nusgart graduation year 2017

Recommender Deb Scarano dscarano@imsa.edu

(name) (email)

Recommender: The student listed above wishes to participate in the Student Inquiry and Research (SIR) Program. SIR advisors are frequently requesting additional information so your assistance is needed in recommending and evaluating students. This completed form, as a pdf file, may be sent to off-campus individuals to assist with best placement of students.

1. Please rate the student on each of the following criteria, with 5 being highest and 1 being lowest, based on your experiences with IMSA students.

Criteria	5	4	3	2	1	No basis for judgment
Motivation for the investigation	x					
Intellectual potential	x					
Ability to analyze/problem solve	x					
Teamwork skills		x				
Perseverance	x					
Maturity		x				
Works independently	x					
Communication skills	x	x				
Integrity						
Overall judgment	x					

Please comment on the preparedness of the student to participate in an independent investigation.

Nicholas is well prepared to do an independent investigation. He is highly motivated to do this investigation and he demonstrates his love of science in everything he does. He is constantly reading about science discoveries and he has done an excellent job in my chemistry course. Nicholas asks very well thought out questions and constantly strives to deepen his understanding. He currently has an A in SI Chemistry, which tends to be very challenging for many students.

Is there anything else that you feel a potential advisor should know about this student?

Nicholas has a wry sense of humor and may seem a little “odd” when you first meet him. He has a lot of nervous energy, but he is fascinated with science and he has a sharp intellect. He is up for the challenge.